Jan., 1954]

THE HABITS AND OCCURRENCE OF THE NUDI-BRANCH, ARMINA TIGRINA, IN SOUTH-EAST UNITED STATES

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Specimens of the nudibranch mollusk, Armina tigrina Rafinesque, have appeared in collections recently sent to the U. S. National Museum for identification. Because this genus has not been hitherto recorded from the east coast of North America (except for one obscure reference by K. J. Bush in Verrill 1885, p. 586), we are giving here a brief diagnosis, the synonymy, geographical records and habits of this relatively common species. A. trigrina is common in the Mediterranean Sea, and our American specimens show no important differences in either animal or radula characters. Although this species has not been figured in American literature, a number of illustrations, including several in color, have appeared in European works, as noted in the synonymy of the species. The most readily available figure appears in Paul Fischer's Manuel de Conchyliologie, 1887, p. 551, fig. 289 (as Pleurophyllidia lineata Otto).

Diagnosis.—Animal about 2 inches in length and 3/4 inch in width; somewhat lanceolate in shape, as seen from above; broad in front and tapering to a point posteriorly. Notum or back smoothish, brownish black in color with about 25 to 45 narrow, vellowish or whitish, longitudinal stripes. The notum overhangs the sides of the body. There is a series of 25 to 35 obliquelyarranged lamellae attached to the underside of the margins of the notum on each side of the animal. Anterior to these, there is a more compact series of short, very thin, crowded gill-lamellae. Rhinophores close together, short, cylindrical, with a laminated surface, dark-brown in color in preserved specimens and retractile. Internal buccal mass large, with strong jaws and a relatively large radula ribbon. The latter consists of 30 to 50 transverse rows of golden-brown teeth, with a large, quadrate, denticulate central tooth which is flanked on either side by 60 to 70 smaller, sickle-shaped laterals.

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Superfamily ARMINACEA

Family ARMINIDAE

Genus ARMINA Rafinesque

- Armina Rafinesque 1814, Précis des Découvert. Somiologiques ou Zool. et Botaniques. Palermo, p. 30, no. 21 (see W. G. Binney and G. W. Tryon 1864, Compl. Writings of . . . Rafinesque . . .Conch., p. 12). Type by subsequent designation: Armina tigrina Raf. by Iredale and O'Donoghue 1923, p. 217.
- Pleurophyllidia Stammer 1816, Dissert. Anatom.-Medica Observ. ex Anatomia Compar. Halae, p. 30. Type by monotypy: Pl. undulata Stammer = A. tigrina Raf.
- Diphyllidia A. W. Otto 1820, Nova Acta Physico-Medica, Acad. Caesar. Leopold.-Carolin., vol. 10, pt. 1, p. 126. Type by monotypy: D. lineata Otto = A. tigrina Raf.

Armina tigrina Rafinesque

- Armina tigrina Rafinesque 1814, Précis Découv. Somiol. Zool. Botan. Palermo, p. 30, no. 21 (no locality stated, but probably Sicily).
- Pleurophyllidia undulata Stammer 1816, Dissert. Anat.-Med. Observ. ex Anatom. Comp., p. 30. (Neopolitano.)
- Diphyllidia lineata A. W. Otto 1820, Nova Acta Physico-Medica, Acad. Caesar. Leopold.-Carolin., vol. 10, pt. 1, pp. 121–126, pl. 7, figs. 1a, b, c (in color). (Neapel.)
- Pleurophyllidia cuvieri Meckel, K. J. Bush in A. E. Verrill 1885, Annual Report Comm. Fish and Fisheries for 1883 (Wash., D. C.), p. 586.
- Armina tigrina Raf., Pruvot-Fol 1937, Archives du Mus. National d'Hist. Natur., series 6, vol. 14, pp. 57–59, pl. 1, fig. 1 (in color).

Anatomical details of this species are found in Bergh 1866, pp. 16–29, pl. 1, figs. 1–39; Vayssière 1901, pp. 116–121, pl. 6, figs. 16–22; Souleyet's *Voyage de La Bonite*, 1841, Atlas, pl. 24E, figs. 1–17; text pp. 455–459; Cuénot 1915, pp. 22–29; and Pruvot-Fol 1937, pp. 57–59, pl. 1, fig. 1. The latter figures and describes the egg-case as being a five-inch-long, spirally-coiled gelatinous string containing numerous, pale rose-coral eggs.

Habits.—Members of the genus Armina have been reported as being sand burrowers (Kelaart 1859, p. 494; Eliot 1906, p. 679; and Cuénot 1915, p. 25). In 1940, Miss E. B. Richardson of the Charleston Museum in South Carolina made notes (*in litt.*) which we are quoting here on the habits of this species. Numerous specimens were observed on the lower reaches of the Fort Moultrie, South Carolina, beach at low tide in December 1939. "When we first got to the beach, the animals were just emerging. They occurred in a stretch of from 15 to 18 feet from the low water mark. The first sign of emergence is the rising of a small crown of sand anywhere from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch across. The head appears first with the underside of the body uppermost. Where the sand is comparatively hard, the two-inch-deep holes remain, showing a diameter of $\frac{1}{4}$ to $\frac{1}{2}$ inch; when in the wetter part of the beach, the holes cave in and leave little sign. The longest track we saw was about 7 feet in length. It had a decidedly corrugated appearance, and bore a trail of slime. One of the live animals that we brought back to the museum made itself into a ball, and then pushed itself head first into the sand. The body of the animal can be stretched considerably when in motion. The mantle usually hangs over and touches the foot, but now and then is restlessly undulated. The color of the living animals is bright cream with gray-black lines, although in some specimens I see an olive-green color. They are very thin, and the orange digestive organs can be seen quite plainly."

Mr. Joel Hedgpeth who has sent us specimens from the Gulf of Mexico reports (*in litt.*) that this species is common along the Texas coast just offshore.

Records.—NORTH CAROLINA: 20 miles due east of Cape Hatteras, 15 fathoms. Fine sand; bottom temperature 68° F. Albatross station 2007. 1883. SOUTH CAROLINA: Fort Moultrie, Sullivan's Island, Charleston Co. (E. B. Richardson, 1939–40). Texas: off Port Arkansas, 20 fathoms (J. W. Hedgpeth, Jan. 25, 1946); off Port Isabel (J. W. Hedgpeth, Mar. 30, 1947). MEXICO: off Puerto Obregon, Gulf of Campeche, 13 to 20 fathoms (Henry Hildebrand, August 1951).

The Albatross record off Cape Hatteras was included by K. J. Bush in a list of mollusks (see A. E. Verrill 1885, p. 586) as *Pleurophyllidia cuvieri* Meckel. Bush probably was referring to *Armina cuvieri* d'Orbigny 1837 which, however, appears to be another species from western South America. I have examined the *Albatross* specimen and find it is *A. tigrina* Raf.

LITERATURE CITED

References appearing in the synonymies are not repeated here.

- BERGH, R. 1866. Bidrag til en Monographi af Pleurophyllidierne. Naturhistorisk Tidsskrift (Copenhagen), 3rd series, vol. 4, pp. 1-80, 9 pls.
- BERGH, R. 1890. Weitere Beiträge zur Kenntniss der Pleurophyllidien. Verhandl. der k. k. zoologisch-botanischen Gesellschaft in Wien, vol. 60, pp. 3-16, 2 pls.
- CUÉNOT, L. 1915. Pleurophyllidiens. Bull. Station Biologique d'Arcachon (Univ. Bordeaux), vol. 16, pp. 25-36.
- IREDALE, T. and C. H. O'DONOGHUE. 1923. List of British Nudibranchiate Mollusca. Proc. Malacol. Soc. London, vol. 15, pts. 4-5, pp. 195-233 [217].
- KELAART, E. F. 1859. Descriptions of New and Little-known Species of Ceylonese Nudibranchiate Mollusks. Ann. Mag. Nat. Hist., series 3, vol. 3, pp. 291–304; 488–496 [see 494].
- OHSHIMA, H. 1933. Young Pyenogonids found Parasitic on Nudibranchs. Annot. Zool. Japon, vol. 14, pp. 61-66.
- VAYSSIÈRE, A. 1901. Recherches Zool. et Anat. sur les Mollusques Opisthobranches du Golfe de Marseille (pt. 3). Annales Mus. d'Hist. Nat. Marseille, vol. 6, pp. 1–130, 7 pls.
- VERRILL, A. E. 1885. Results of Explorations of the Steamer Albatross off the Northern Coast of U. S. in 1883. Annual Report Commission Fish and Fisheries for 1883. Wash., D. C. [p. 586], pp. 506-610, 44 pls.
- VON IHERING, H. 1886. Zur Kenntniss der Nudibranchien der brasilianischen Küste. Jahrbücher der Deutschen Malakozool. Gesellschaft, vol. 13, pp. 223–240, pl. 9 [*Pl. mülleri*].

A KEY TO THE HAWAIIAN CYPRAEIDAE

BY JOAN DEMOND

The Cypraeidae, particularly the beautifully colored species of the Hawaiian Islands, are among the mollusks most attractive to collectors. However, to my knowledge, there is no key to these species available. Consequently, I have devised such a key in the hope that it will aid in identification.

According to Ingram (1937), 29 species of Cypraeidae are found in the waters of the Hawaiian Islands, five of which are endemic to the Hawaiian Islands. Twenty-eight of these species